

THE
Anti-Coxin Treatment
of Diphtheria :
In Theory and Practice.

BY

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THE ETHICS OF THE QUESTION.

THE Anti-Vivisectional interest attaching to the question of the use of Diphtheria Anti-Toxin serum lies in the fact that cruelty of a grave character is practised, mainly upon horses, in order to obtain this particular nostrum. From this standpoint of morality, even were the presumed remedy effectual in alleviating or curing diphtheria, we should be justified in condemning its use. Man has no right to do evil that good may come, neither are we justified in promoting the benefit of creatures belonging to a higher order in the scale of animal life by means of the infliction of enforced suffering upon equally sensitive creatures of an inferior type.

But if, upon the other hand, the supposed remedy is proved to be highly dangerous in its operation (as has been shown in many recent fatal instances); and if, at the same time, experience shows it to be ineffective in reducing the mortality of the disease it professes to cure, then its use becomes almost criminal, and its permission a grave reflection upon the Legislature of this country.

Not merely is its morality, its utility, its innocence, in question, but even its scientific claims are of doubtful value. Those scientific claims rest upon the unproved theory that a certain bacillus discovered by Löffler is the active origin of diphtheria.

PROCESS OF MANUFACTURE.

A cultivated portion of diphtheritic membrane is injected into the blood-stream of an animal, and when, as the result of the circulation of this morbid material, a condition of fever, with rapid breathing, shivering, probably sweating and diarrhœa, swellings, &c.—in fact, all the symptoms of blood-

poisoning—is set up, the animal is supposed to be in a diphtheritic condition, a blood-vessel is opened and a certain quantity of blood collected, and after coagulation has taken place, the clear supernatant fluid termed *serum* is drawn off, for injection into human bodies.

ITS COMMERCIAL ASPECT.

The manufacture and sale of this strange invention has become a source of gigantic commercial enterprise. A poor worn-out horse costing £3 or £4, if bled every ten days, would yield about two quarts of serum on each occasion, which can be sold at £12 per quart—an income of £800 per annum before the poor creature dies from bleeding or infection.

THE THEORY OF IT.

When a portion of the wash-leather exudation which is thrown out upon the back of the throat in cases of diphtheria is transferred to a cultivating medium, it is taken for granted that the microscopic organisms contained therein, and which rapidly multiply when transferred with the morbid material upon which they feed, are the real and true source of all the mischief. The resulting filtered product is deemed to be a pure culture of the *diphtheritic bacillus*. This is repeatedly injected into the body of an animal until, after a time, the wretched creature is said to be “immune,” that is, insusceptible, partially or wholly, to the action of the diphtheria bacillus or its poisons. Then, if the serum of this animal’s blood be injected into the human blood, it is supposed to confer a corresponding “immunity” upon the individual who is subjected to this remarkable operation.

THE DIPHTHERITIC BACILLUS.

If, however, there are grave doubts as to Löffler’s bacillus being the origin of the disease in question, it stands to reason that its cultivation must be also a very questionable proceeding; the injection of its “culture” a very grave undertaking; and the much-lauded results of a somewhat problematical nature.

Now, the behaviour of this microscopic organism does not fulfil any of the conditions which have been laid down by leading scientists as essential to the character of a specific bacillus. In the first place, it is not uncommonly absent altogether from the disease of which it is supposed to be the sole originator. Löffler himself found it absent in 25 per cent. of the cases which had been diagnosed as diphtheria, but it is

always easy to shuffle out of that difficulty when a scientist has a theory to maintain, by saying, despite of the signs and symptoms and results, "It could not have been diphtheria"! Other observers besides Löffler have failed in a much larger percentage of cases to discover this bacillus in well-authenticated instances of diphtheria.

There is another difficulty: this same bacillus has been found in hundreds of well-authenticated instances by numerous scientific observers in healthy and even unhealthy throats (such as in patients recovering from scarlet fever) without any diphtheria resulting, and yet it is claimed as one of the conditions of a specific bacillus that it must never be found apart from the disease it originates, much less in a healthy individual.

Moreover, if a bacillus be a specific organism, it is laid down as an axiom that when a pure culture is injected into an animal's body it must reproduce in that animal an identical disease to that which had obtained in man; but, alas for this "scientific" theory, the diphtheria experimentally produced in guinea-pigs and other animals is found to bear no resemblance to the diphtheria in the human species.

Looking at it, then, from every point of view, the claim of "Löffler's bacillus" to be the origin of diphtheria is, to say the least of it, unproved, for it fails to satisfy any of the conditions which its advocates have themselves laid down as the absolute essentials of a specific germ. This being the case, sero-therapy, which stands or falls with the specificity or otherwise of the bacillus, must itself be viewed with suspicion, and unless experience, as manifested in statistics, can save it from humiliation, Diphtheria Anti-Toxin must be looked upon as a fraud.

THE STATISTICS.

It is this aspect of the question that Dr. De Maurans, the editor of a leading French journal, *La Semaine Médicale*, has recently set himself to solve in the columns of his professional organ.

The article he has written presents no fewer than thirty-three statistical charts showing graphically the course which diphtheria mortality has taken during eleven years prior to the introduction of anti-toxin, and for seven years subsequent to that period, in leading towns scattered over Europe.

The writer prefaces his investigation by drawing attention to the *furor* created by the introduction of diphtheritic serum seven years ago, not only in the medical world, but among the general public, and the brilliant statistics which heralded the discovery, and apparently justified the extraordinary enthusiasm.

In spite of all this excitement, however, Dr. De Maurans observes that the general mortality of diphtheria continued very high, and in some towns presented a very disquieting ascent; and he instances the fact that the Minister of the Interior of France had recently circularised the Medical Sanitary Officials, pointing out the high mortality—more than half of those attacked, and in cases, too, where the serum was used, urging them to use their influence with general practitioners to see that only *fresh* serum was injected, the failure to protect from the disease being apparently attributed to stale anti-toxin.

The steady progress of the mortality from diphtheria in Paris year by year, in spite of anti-toxin, at last led him as an independent and painstaking investigator (though an orthodox believer in the serum) to request the Boards of Health in the principal European towns to furnish him with the official statistics of deaths from diphtheria from 1883 to 1900 (a period of eighteen years), as well as the number of cases notified. He received thirty-two answers in all, and he has added the tables of Paris and Buenos Ayres. The tables present in a most interesting fashion the peculiarities of each, illustrating different phases of the subject.

RELATION OF DEATHS TO CASES.

Dr. De Maurans found it very difficult to obtain the actual case mortality from his various correspondents, owing to the irregularity of the notifications in many towns. But he shows by graphic illustrations of Buda Pesth and Prague that this is not of the importance which might appear at first sight, as the absolute mortality of diphtheria may be considered a very faithful mirror of case mortality—that is, the number of deaths to cases. Were it otherwise, we should have to admit, from the disproportionate number of cases to that of deaths, that diphtheria had considerably increased, a circumstance unlikely in a period of marked hygienic progress, both public and private.

A glance at the charts for the town of Buda Pesth shows an absolute parallel in the up and down curves during the whole eighteen years, corresponding the one to the number of deaths, and the other to the percentage of deaths to cases. The latter reached its culminating point in 1887 (61·4 per cent.); it commenced to descend the following year and reached its minimum ten years later (12 per cent. in 1897). It had already fallen to 32·9 per cent. in 1894, the year of the introduction of diphtheritic serum.

The Prague chart is none the less demonstrative.

Seeing, then, the impossibility of obtaining exact data as to the total number of cases, and the comparison of the latter with the number of deaths, the investigations are confined to a consideration of mortality alone.

DIFFERENCES BETWEEN THE YEARS 1894 AND 1895.

In order to test the effect of sero-therapy upon the mortality of diphtheria, the investigator in the first place deals with the curve representing the mortality which took place between the years 1894 and 1895. It was only during the last months of 1894 that diphtheritic serum came into general use, and one must admit that the figures of that same year are but slightly modified. Some of the charts appear to plead in favour of the sero-therapy. For instance :—

Glasgow—deaths in 1894—200.	In 1895—137
Zurich „ 87	„ 25
Lille „ 106	„ 42
Cologne „ 421	„ 173

The above figures, considered by themselves, appear to show that the advent of sero-therapy was marked by a marvellous and sudden decline.

But on looking more closely at the chart, one sees that there are other points to be considered.

At Lille, for instance, the deaths from diphtheria increased steadily from 1886 to 1889, and then went down spontaneously from 1889 to 1891; then up again in 1892, to assume in 1893 and 1894 a descending wave, which was greatly accentuated in 1894 to 1895.

Cologne shows the same phenomena. The ascent began in 1889, reached its highest point in 1893. Descent began again in 1894, and was still further accelerated in 1895.

Hence, from the statistics of these towns (which are the most favourable of any to anti-toxin) it is clear that *the mortality was already on the decline when the new method of sero-therapy was introduced*. But, seeing that in several towns the fall of diphtheritic mortality was coincident with the introduction of anti-toxin, the question naturally arises: Was it due to the serum, or was it merely a coincidence? The examination of other charts throws some light upon this point.

SUDDEN DECREASES PRIOR TO 1894.

If it can be shown that prior to the year 1894, when the serum was introduced, there had been any other equally sudden declines in diphtheritic mortality besides those given for the years 1894 and 1895—declines unaccompanied by the

boom of any particular therapeutic agent—we shall be saved from too hasty a conclusion. Let us look at:—

Rome.—There were 77 deaths from diphtheria in 1884. The mortality rose by continued progression (with the exception of light exacerbations) until the year 1891, when they reached 302; then the deaths fell with no less regularity to 47 in 1894. In 1897 the number was but 19.

Berne.—Here it is the year 1894 itself which corresponds to the minimum of deaths from diphtheria, at which point a rise begins.

Christiania.—The ascent occupies the whole period between 1883 and 1887—namely, from 50 deaths to 445; then comes a rapid decline which was completed in 1892 by 90 deaths.

Berlin.—The mortality fell spontaneously from 2,651 in 1883 to only 860 in 1888. Then it went up to 1,492 in 1890, but dropped to 1,009 in 1891. There was another maximum in 1893, 1,581, then a spontaneous fall in the following year to 1,361. This descent continued until 1897.

Lyons.—In 1883 to 1890 the deaths ran up from 93 to 341, and then rapidly fell again to 83 in 1894.

Brussels.—These peculiarities are almost identical.

Leipsig.—The mortality went down from 383 in 1884 to 168 in 1888, then mounted up again to 409 in 1893, and from that time continued to decline. But the difference is *less considerable* between 1894 and 1895 (namely, 339 to 316) than between 1893 and 1894 (namely, 409 to 339).

Edinburgh.—This provides a most instructive example. An epidemic of diphtheria commenced in 1883 and attained its acme in 1889, and returned to the usual figures in 1892. It made a second start from 1892 to 1894, its decrease coinciding with the introduction of sero-therapy. The decline ended in 1899. It made another start upwards in 1900, the curve rising from 28 to 53.

Is it not clear that if we only considered for this city the curve between 1892 and 1898 we should be disposed to cry, “What a triumph for diphtheritic serum!” *But when we examine the periods before and after, a very different explanation is afforded.*

MAXIMUMS ATTAINED LONG BEFORE 1894.

A great many towns are included in our next survey—namely, where the maximum of mortality was reached long before 1894, so that at the time sero-therapy was introduced, the

curve had accomplished the greater part of its evolution. Here again we see the fallacy of magnifying the fall which may have taken place in diphtheria deaths from 1894 to 1895, and attributing it to the serum, without taking into consideration the decline which had already set in, and had been going on for some years previously.

For example, take

Paris.—It is true that the tale of death, which was 1,009 in 1894, was not more than 435 in 1895, but the statistics show that the descending movement had commenced as *far back as* 1888 (from 1,730 deaths), and had gone on regularly declining from that time, with the exception of a slight rise in 1892.

Geneva.—The mortality fell between 1891 and 1895 from 107 to 9. It had not fallen to more than 34 in 1894.

Buda Pesth.—The number of deaths rose by almost continuous progression from 246 in 1883 to 927 in 1892. It had already fallen by an almost vertical decline to 529 in 1894. The minimum of 108 was reached in 1897.

Copenhagen.—There was a very rapid increase between 1883 and 1891 (from 104 to 518 deaths). Then a fall equally sudden to 320 in 1894 and 78 in 1896.

Havre.—The fall commenced in 1883 (112 deaths) and was continued without interruption for seven years (39 deaths in 1890); a slight rise brings the mortality up to 59 in 1894. From then the decrease has continued.

Nantes.—This town records 104 deaths in 1884; 67 in 1893; not more than 31 in 1894.

Toulouse.—Although the figures are too feeble to admit of any very definite conclusions, nevertheless, the chart shows that after several oscillations from 1887 to 1893, the deaths suddenly fell from 22 in 1893 to 13 in 1894, then to 11 in 1895. It has gone up for the last three years.

Turin.—From 184 deaths in 1886, after several variations, fell to 118 in 1894.

Amsterdam.—This is particularly instructive. The deaths reached 935 in 1883 and went down to 142 in 1894, whereas 168 fatal cases were recorded in 1896.

Stuttgart records 220 deaths from diphtheria in 1890; 282 in 1892; and only 159 in 1894.

Munich shows a mortality of 401 in 1889; reduced to 284 in 1894; a further fall to 260 in 1895.

Hamburg.—After an ascent from 366 to 653 between 1883

and 1887, a minimum of 249 was reached in 1891 without any sero-therapy ; it rose again for three years until it reached 425 in 1894, then a fall went on to 1896 (99 deaths). The mortality then again went up, reaching 119 deaths in 1900.

Prague.—From 77 deaths in 1885 the record reaches to 197 in 1888. Then it falls considerably, to 66 deaths in 1891. There is a reascent until 1893, reaching 121 deaths, scoring a minimum of 26 deaths three years later.

Buenos Ayres.—Here the deaths fall from 1,385 in 1888 to 445 in 1894, a minimum of 151 deaths being reached three years later. Since then the curve has gone up.

London.—This deserves particular notice. The mortality between 1886 and 1893 went up from 846 to 3,196, and commenced to go down from 1894. This movement continued in 1895, the first rise occurring in 1896, when there is an almost vertical fall until 1898, then a second rise in 1899, with a descent again in 1900.

The preceding statistics have shown that *the fall in the mortality of diphtheria was an accomplished fact before the introduction of the much-vaunted serum.*

TOWNS WHERE DEATHS HAVE RISEN SINCE 1894.

The following figures will prove even more demonstrative than the foregoing, since they will present towns where the deaths from diphtheria have continued to rise since the year 1894, when sero-therapy commenced. Anti-toxin was introduced into England in 1895, a little later than on the Continent.

Birmingham.—The curve began to rise in 1892 ; in 1894 there were 91 deaths ; in 1895, 214 ; in 1896, 293, when the maximum was reached, and the curve redescends rapidly to 77 deaths in 1900.

Liverpool.—After considerable oscillation the deaths reached their lowest point of 47 in 1892 and 1893, 65 in 1894, 120 in 1896, 192 in 1899 ; the fall began in 1900.

Dublin.—There were 14 deaths in 1894 ; 18 in 1896 ; 70 in 1897 ; then the deaths decreased from 1897 to 1900.

Bucharest.—There was a very slight fall in 1895 (from 71 to 58) ; since that date there has been a *continuous and progressive rise* in the mortality, which reached, in 1899, the highest point which had been observed from 1883–1900 (253 deaths). The descent commenced in 1900.

Stockholm.—The last fall which commenced in 1894 continued to rapidly decline until 1896. Then, from 1897 to

1899 the number of deaths went up from 43 to 323 ; here again, in 1900, a marked diminution began.

IS DIPHTHERIA AN EPIDEMIC DISEASE ?

There is but one conclusion which can be drawn from this collection of facts—namely, that diphtheria comes in epidemics. After a period of variable length during which the number of deaths is fairly constant and fluctuations are but of secondary importance, there comes a sudden jump of almost vertical ascent, reaching its maximum in the course of two or three years. The decline, however, never appears to be so rapid as the ascent ; the secondary increases are generally one, or two, or sometimes three, until the minimum is reached, and the situation remains stationary, with a few feeble oscillations, for a certain number of years until the ascent begins again.

These epidemics pay no attention to sero-therapy ; they laugh these modern methods of bacteriologists to scorn. Sometimes, as we see, the evolution of one of these epidemics concludes before the introduction of sero-therapy ; sometimes its acme was coincident with it ; sometimes after it. And this is proved to be the case by the figures Dr. De Maurans supplies for the City of Paris, according to the weekly bulletins issued by the statistical department. The mortality shows a continuous upward curve representing more than double the number of deaths in 1901 to that of 1900. In the latter year diphtheria killed 294, but the number for 1901 is some 700, no such total having been reached since 1894. A clear proof that diphtheria is absolutely independent of therapeutic methods.

IS SERO-THERAPY OF NO AVAIL ?

In spite of the crushing evidence against the therapeutic value of anti-toxin which is supplied by the statistics Dr. De Maurans himself has collected, he is, strange to say, disinclined to discard its value entirely. He believes it to have a certain beneficial local effect upon the disease (an opinion very difficult, if not impossible, to prove), but he candidly confesses it cannot be a specific remedy, as, if it were, the mortality ought to remain proportionately the same ; that is, the fatality would be practically uniform. Instancing Paris, he shows :—

For the first 11 months of 1901 there were 4,347 cases, 630 deaths, a fatality of 14·49 per cent.

In the first 11 months of 1895, the year most favourable to sero-therapy, there were 3,842 cases, 362 deaths, a fatality of only 9·42 per cent.

Thus from January 1 to November 30, 1901, for only 505 more cases than in the corresponding period of 1895, there

were actually 268 more deaths ! The writer, therefore, argues, in view of this extraordinary difference of fatality between 9·42 in 1895 and 14·49 in 1901, that either the power of the anti-toxin varies, or else it is not possessed of the specificity which has been attributed to it.

Paris, however, is not an isolated example, for, from the official statistics obtained from Berlin as to the fatality from diphtheria, the following interesting data are obtained :—

In 1895	5,972	cases,	939	deaths,	a fatality of	15·7	per cent.
1896	4,178	„	515	„	„	12·3	„
1897	3,646	„	507	„	„	13·9	„
1898	4,278	„	608	„	„	14·2	„
1899	3,817	„	608	„	„	15·9	„
1900	3,096	„	534	„	„	17·2	„

That is, for the five years since anti-toxin came into general use, there has been a regular and constant progression in the death-rate—a fact which places the diphtheritic serum in a most unenviable light.

Whichever way one looks at this question, in whatever light it may be viewed, it is, to my mind, impossible to disguise the fact that the boasted results of anti-toxin are illusory. There may be periods when, for the moment, the statistics may appear favourable to sero-therapy. A decline sets in, perhaps, coincidently with its use ; or an epidemic may be of a milder form, and the serum gets all the credit, but by patiently waiting, and bearing in mind the oscillations which have taken place previously, the same facts which have been already adduced from the statistics so painstakingly collected by the Editor of *La Semaine Médicale* will become apparent.

There is still another question worthy of consideration, as to how far anti-toxin may itself have increased the fatality, which in the cases quoted above has been marked since its introduction.

In other cases there may be an apparent temporary decline in the fatality of anti-toxined cases, owing to the number of ordinary ulcerated sore throats which have been swept into the count, and the practically moribund cases of diphtheria which have swelled the death-rate of the class not subjected to this treatment.

The rapid increase of cases after the introduction of anti-toxin is markedly shown by Coakley in American statistics. In Boston, for the three years prior to 1894, the notified cases only averaged about 1,000 annually, but in 1894 and 1895—the serum years—they jumped up to 3,000 and 4,000. In New York, for the same period before, the average number of cases

was about 5,000, but in 1894 and 1895 they reached 9,000 and 10,000. In Brooklyn, again, the notifications were trebled. The cases were, of course, diagnosed as diphtheria on the basis of the presence of the Löffler bacillus, and owing to the numerous fictitious additions, the diphtheritic death-rate was lowered, and the anti-toxin got the credit of this bacteriological and statistical blunder.

STATISTICS OF ENGLAND AND WALES.

In the year 1885 there were 4,471 deaths from diphtheria throughout England and Wales. With slight variations the mortality gradually increased until it reached the enormous total of 9,466 in 1893. A decline set in in the year 1894—that is, twelve months before anti-toxin was introduced into this country—the total mortality of that year being 8,774. In the next year (during the latter part of which anti-toxin was introduced into this country) the total number of deaths was reduced to 7,895, but in the following year—1896—(when anti-toxin was in almost universal use) the mortality again rose to 8,993, and although in the two following years a slight reduction occurred, yet it again rose in 1899 to the heavy total of 9,205; and in 1900 (that is, five years after the introduction of anti-toxin) the mortality had reached 9,345—the highest year but one upon record. Following the usual course of ascent and decline, in the year 1901 a decreased mortality set in, and it has shown a continued reduction down to the year of the last published Returns, 1904, when the deaths reach a total of 5,763.

Allowing for increase of population, it will be found that the rates per million bear a remarkable correspondence to the number of deaths alone. In 1885 the mortality was 164 per million. In 1893 it had reached a total of 318 per million. In 1895 it was reduced to 259, but in 1896 the mortality had again risen to 291 per million, and in the year 1900, in spite of five years' anti-toxin treatment, the mortality per million was still 290. From that date to 1904 there has been a gradual reduction, standing in this latter year at 170 per million, which, as will be seen, is considerably higher than in the year 1885—ten years before the anti-toxin period.

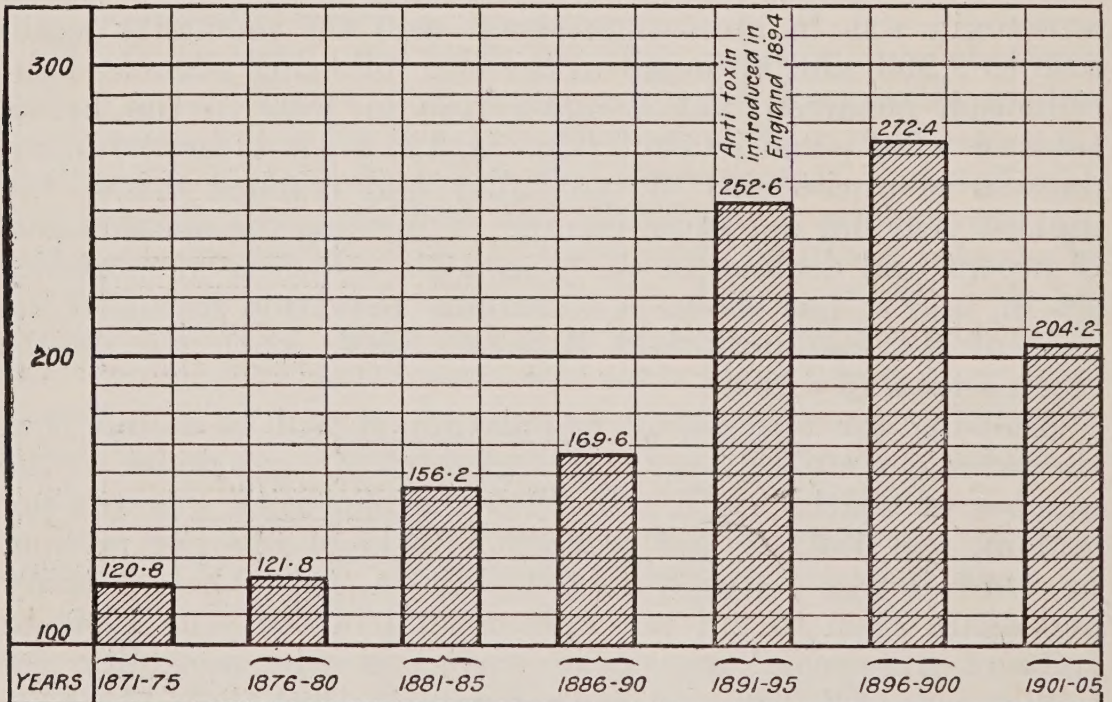
According to the Registrar-General's Returns, throughout the whole decennium from 1871–80, the average mortality per million persons living from diphtheria did not rise above 121. No such low mortality is seen throughout the whole anti-toxin period, from the date of its introduction ten years ago until the present time.

Taking the mortality returns for the 10 years

antecedent to the introduction of anti-toxin (1885-1894) and comparing them with the 10 years subsequent thereto (1895-1904), we find that the former period shows a mortality of only 200 per million persons living, against 235 in the latter. Such figures are a far more satisfactory guide than hospital fatality statistics, for the latter are full of fallacies and are quite unreliable as a scientific guide. In the first place, a diagnosis which for the most part discards clinical appearances and rests its case upon bacteriological examination must of necessity mark down as diphtheria numerous cases which are not

STATISTICS FROM REGISTRAR-GENERAL'S REPORT, 1908.

The annual death-rate per million persons living from *Diphtheria* in successive quinquennia, 1871-1905, in England and Wales:—



diphtheria at all; and in the second place, will exclude numerous cases of well-authenticated diphtheria in which the anti-toxin has been refused upon the plea that the disease has existed too long, or is of too severe a type. This entirely vitiates the statistics; not only can no fair comparison be drawn with other periods or cases, but the great reduction in the death-rate which results from this fallacious method is out of all proportion to the actual facts. Moreover, the value of any professed prophylactic as a specific must be considerably

reduced when we are told it is useless to try it in cases where it is most needed, or that it must only be used in cases where the patients would in all probability get well without it. There can be no mistake, however, about the Registrar-General's mortality returns, and if a specific remedy for a certain disease, which has come into general use, fails to reduce the death-rate from that disease, its reputed value as a prophylactic must rest upon a very shadowy foundation.

LONDON AND THE PROVINCES.

The diphtheria mortality returns per million for London bear a most remarkable corresponding ratio to the above-quoted returns for England and Wales. This is a further instance of the waves of epidemicity, which follow one general course, but which are aggravated in certain areas in consequence, possibly, of local conditions, such as greater overcrowding and lack of sanitary and hygienic precautions. This suggestion is supported somewhat by the statistics which show that diphtheria is much more severe in urban than in rural districts. In the case of children under five years of age the diphtheria mortality from 1899–1903 is as follows :—

England and Wales	..	..	..	..	..	1·52
Urban Counties	..	..	..	..	..	1·83
Rural Counties	..	..	..	..	..	0·94

In 1904 we see a similar result :—

England and Wales	..	..	..	..	..	1·00
Urban Counties	..	..	..	..	..	1·16
Rural Counties	..	..	..	..	..	0·68

That is, the mortality in urban counties is double that of the rural districts, and yet I think we may safely conclude it is in the urban districts that anti-toxin would be the more largely used.

It is noteworthy, too, that certain parts of England have been more seriously affected than others. In the county of Durham diphtheria mortality, which had risen rapidly throughout the five years ended 1903, further rose in 1904 to 285 per million, although the mortality of England and Wales was only 170, and that of London 159. In Darlington the mortality rate rose as high as 426 per million ; in Hartlepool 449, and in Stockton 572.

In Glamorganshire the rates rise from 202 per million in Cardiff to the tremendous figure of 877 per million in Pontardawe. Again, in the Wolstanton and Stoke-upon-Trent dis-

tricts of Staffordshire the mortality rate was equal to 504 per million ; in the districts of Basford and Nottingham the rate averaged 315, although that of the remainder of the county did not exceed 90.

One of the most interesting cases for consideration is that of the East Riding of York, where the high death-rate from diphtheria is due to the excessive fatality in Hull ; the remainder of the county as a whole being below the average of Extra-Metropolitan England. **The Hull diphtheritic mortality from 1891-1894 ranged between .05 and .09 per 1,000 persons living. In 1895 (the year when anti-toxin was introduced into this country) it rose to .11, and the year following to .17. There was a slight reduction during the next four years (which at no time went below the rate preceding the anti-toxin period) and in 1901 the mortality stood at .15.**

Apparently to check this death toll, the Hull Corporation decided in 1901 to supply anti-toxin free to the medical practitioners in the city. The result was that in 1902 the diphtheritic death-rate was more than doubled—viz., .34 per 1,000 ; and in 1903 it stood at .30 per 1,000. In spite of a slight fall to .24 per 1,000 in 1904, it rose again last year (1905) to .27. That is, the average death-rate from diphtheria in Hull for the four years during which anti-toxin has been supplied from the public rates is more than four times greater than during the four years immediately preceding its introduction, when anti-toxin was unknown. The Hull statistics appear to show that the death-rate has increased in corresponding ratio to the increased use of anti-toxin serum. It is possible, when the “susceptible material” has been used up, that, following the law of rise and fall governing all zymotic outbreaks, there will shortly be a temporary lull in the death-rate, thus showing once again that therapeutics and zymotics bear practically no relation to one another.

Such figures, with their irregular diphtheritic mortality, point to factors in certain districts which do not exist in other

districts. To say in the face of these figures that anti-toxin has rendered diphtheria "a harmless disease," as has been repeatedly asserted by medical apologists, is to blind the eyes of the profession and public to the true causes of the disease. Until those causes are fairly faced and investigated, and the medical mind diverted from the hallucination of the anti-toxin fetish to the contemplation of the more solid and rational methods of prevention, we must go bungling on, with ever-recurring epidemics, oblivious of the lessons which they emphatically teach.

The scientific seeker after truth must begin his labours and seek his remedies elsewhere than among the archives of inhuman cruelty belonging to the bacteriological laboratory. It is not by adding disease to disease that the evil of diphtheria will be combated, but it is by the removal of the dark, dank, ill-ventilated slums which infest our towns and cities ; by letting light and air into the overcrowded and insanitary dwellings of the poor ; and by the inculcation of lessons of cleanliness and hygiene among the people.

APPENDIX I.

METROPOLITAN ASYLUMS BOARD STATISTICS.

Reduction of the Case Mortality among those Not Treated with Anti-toxin.

At a great meeting held in the Caxton Hall on July 20, 1909, Dr. Hadwen made the following remarks, and displayed the table given on page 19 :—

"We are, of course, accustomed to quote the fact that for the ten years before anti-toxin treatment was introduced the death rate from diphtheria was 200 per million, but for the ten years since anti-toxin was introduced the death-rate rose to 235, so that with the introduction of anti-toxin the death-rate from diphtheria, as shown by the Registrar-General's Returns, has increased instead of decreased. 'Oh, but,' say our friends, 'you should show hospital statistics.' My answer is this : that, owing to the great rage for anti-toxin

and the alleged necessity of catching diphtheria at the earliest possible period, we have a number of sore throats thrown into the count by which the rate is diminished, and thus a grave fallacy is created. Nevertheless, they will say, you cannot prove that. They aver that when anti-toxin was introduced the death-rate from diphtheria was 28 per cent., but it now stands at only 10 per cent. This is what is being quoted continually; this is what Mr. Stephen Paget is continually saying. Now, the Metropolitan Asylums Board have been giving, in their supplement, year after year, the statistics of diphtheria—those treated with anti-toxin and those treated without. Let us give them their 28 and 10, but let us at the same time take the cases treated without anti-toxin, and contrast them side by side. Here are the two tables. Here are the cases treated with anti-toxin for the years 1895–1907. You see in that list [pointing to printed table] the number of cases; here the number of deaths, here the percentage of deaths. Twenty-eight per cent in the first year of all cases treated with anti-toxin comes down to 10 per cent. in 1907. That is the last date of the statistics.

“But they also give cases not treated by anti-toxin. Here are the cases and deaths—these are their own figures. They start at 13 per cent., and wind up with 2·84 per cent. So, whilst the death-rate of those treated with anti-toxin has been reduced from 28 to 10 per cent. the death-rate in the same period of the cases treated without anti-toxin has decreased from 13 to 2 per cent. I was amazed at it myself. It is the most damning piece of evidence against the anti-toxin theory. Where is the proof of the salvation of the children?

“Further, they acknowledge in the Report that those cases treated without anti-toxin contain some of the worst—moribund cases where they dared not apply the anti-toxin, and yet in spite of that the starting-point is 13 against 28, and the reduction is to 2 against 10. When you come to take the amount of reduction, you find that whilst in one case you have reduced the cases treated with anti-toxin one-third, the cases treated without have gone down six times as much. And, taking the average fatality rate for the whole period 1895–1907, we find that that of the anti-toxined cases is 14 per cent., whilst that of the non-anti-toxined cases is only 6 per cent. So you see that statistics of the cases treated with and without anti-toxin by the Metropolitan Asylums Board, that the Research Society depends upon, condemn the theory. They never dare to put the two tables together in tabular form.”

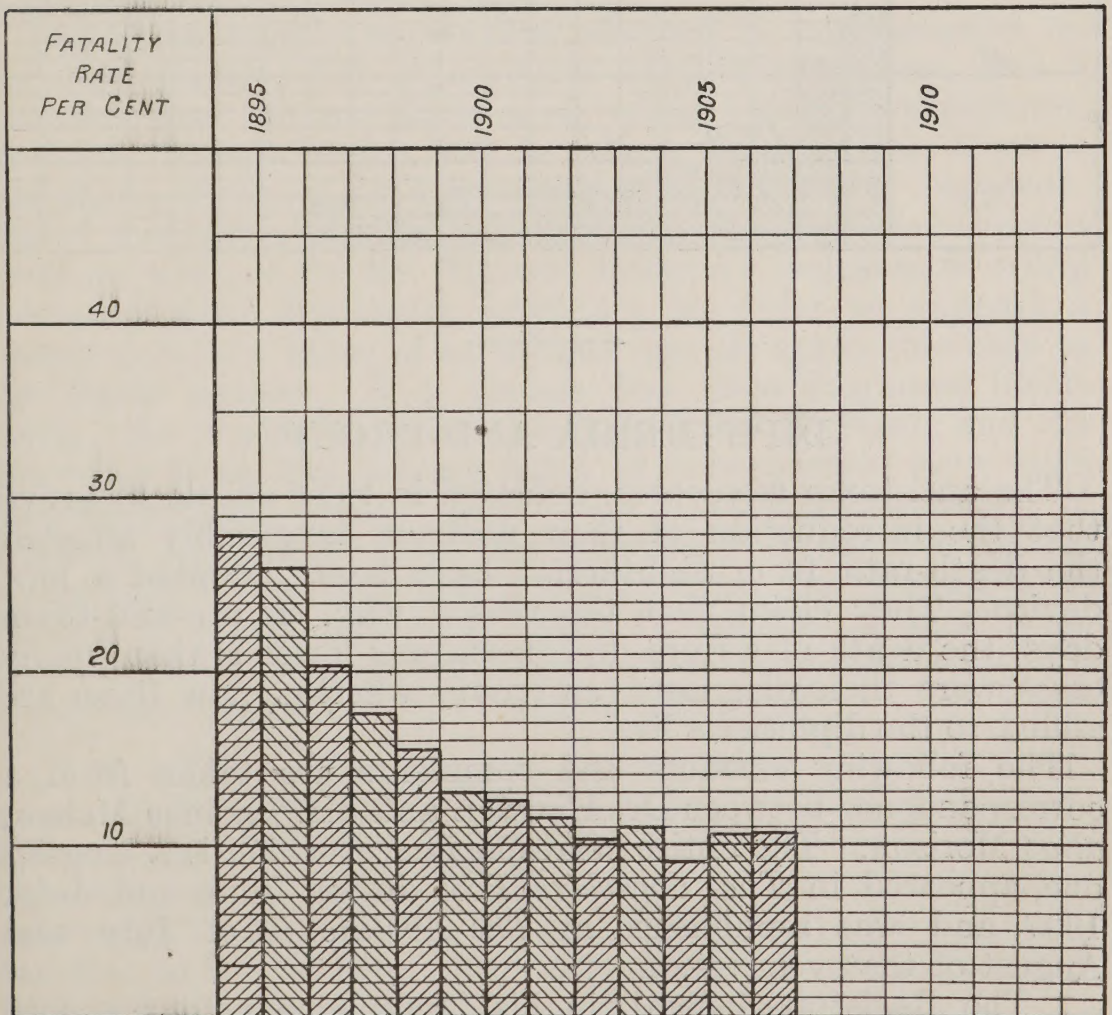
With Anti-toxin.					Per	Without.					Mortality
Year.	Cases.		Deaths.		cent.	Cases.	Deaths.			per cent.	
1895	..	2,182	..	615	..	28·1	1,347	..	181	..	13·4
1896	..	2,764	..	717	..	25·9	1,411	..	154	..	10·9
1897	..	4,381	..	896	..	20·4	1,078	..	62	..	5·7
1898	..	5,186	..	906	..	17·5	1,186	..	84	..	7·0
1899	..	7,038	..	1,082	..	15·38	979	..	44	..	4·4
1900	..	7,271	..	936	..	12·88	954	..	51	..	5·3
1901	..	6,499	..	817	..	12·57	1,013	..	32	..	3·2
1902	..	6,015	..	714	..	11·8	824	..	27	..	3·2
1903	..	4,839	..	493	..	10·18	583	..	11	..	1·88
1904	..	4,070	..	444	..	10·91	569	..	20	..	3·51
1905	..	3,734	..	335	..	9·0	490	..	11	..	2·2
1906	..	4,149	..	432	..	10·4	788	..	12	..	1·5
1907	..	5,121	..	530	..	10·37	494	..	14	..	2·84

Average for the whole period, **14·09** per cent. with anti-toxin.

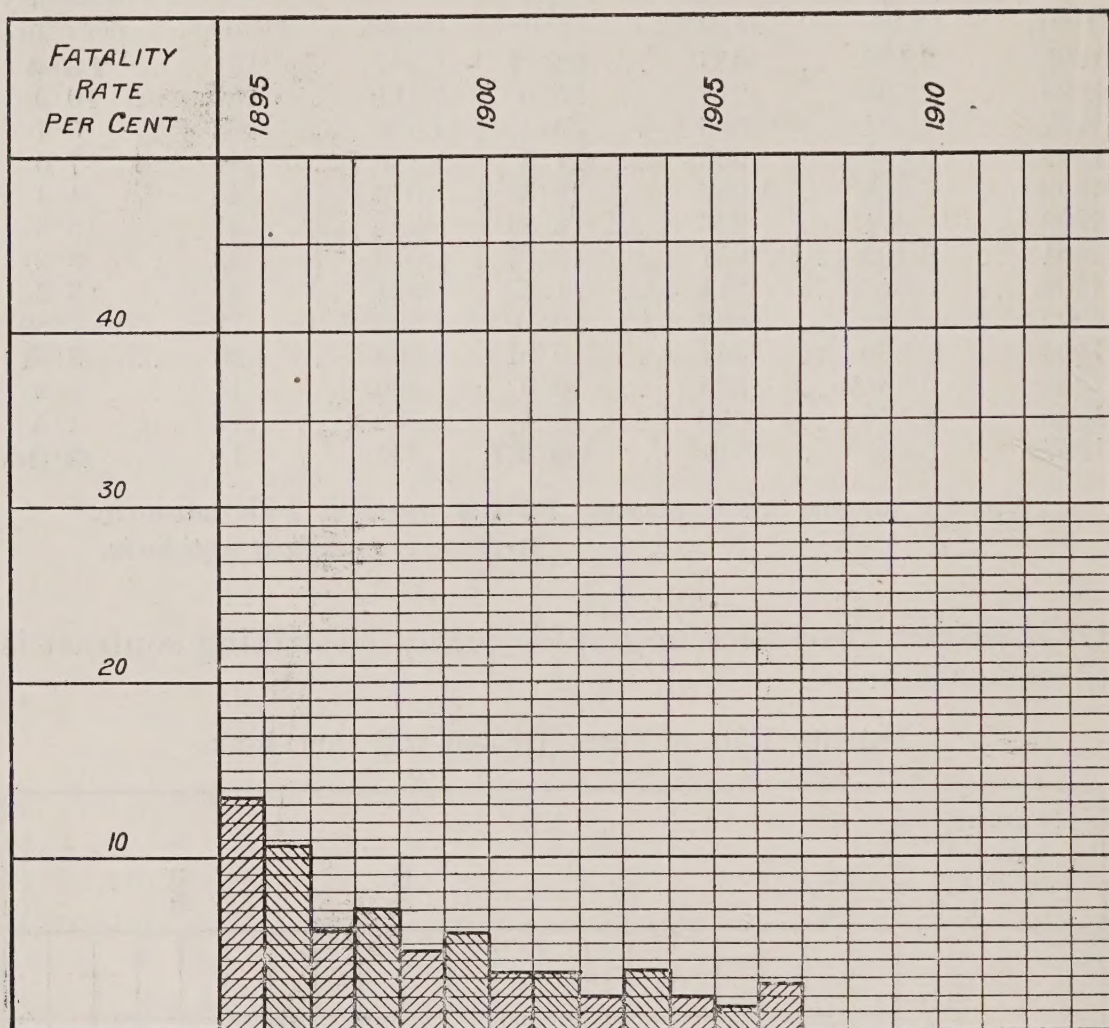
„ „ „ **6·0** „ without anti-toxin.

Or if we put the tables in graphic form, the striking contrast is at once seen :—

Fatality Rate of Cases Treated with Anti-toxin.



Fatality Rate of Cases Treated without Anti-toxin.



DIPHTHERIA AND CROUP.

The anti-toxin advocates, defeated in their efforts to prove that the introduction of their nostrum favourably affected the death-rate from diphtheria, have lately adopted a new device. They claim that the reason why, in pre-anti-toxin days, the death-rate from diphtheria was lower is that many cases were then diagnosed as croup, whereas now these are added to the diphtheria list.

The following extracts and comments are taken from a correspondence between Dr. Hadwen and Mr. Thomas Maben, *alias* Morison. The entire correspondence, which is a lengthy one, appeared in *The Yorkshire Post* during June and July, 1907, and was republished in *The Abolitionist* of July and August of that year:—

“The Registrar-General, in his ‘Supplement to the 65th

Annual Report for the years 1891–1900,' gives a table of the average annual death-rates per million living of diphtheria and croup during the last four decennia. Although the last of these, 1891–1900, does not contain the whole of the anti-toxin period, which commenced in 1894, it forms a very clear guide to the present condition of things, for in the later years—'croup' having, according to the argument, become a vanishing point—diphtheria might fairly be considered by itself. The following is the table :—

Diphtheria and Croup.—Average annual death-rate per million of the population, in periods of ten years.

1861–70.	1871–80;	1881–90.	1891–1900.
390	261	286	314

How do the advocates of anti-toxin explain that in 1871–80 the death-rate from diphtheria and croup combined was only 261, whereas in 1891–1900, after six years of anti-toxin treatment, it had risen to 314? Also, how was it that this figure 261 represented a drop in the death-rate from a previous 390, although at that time no anti-toxin was used?"

On July 12 Dr. Hadwen wrote :—

"I adhere strictly to the line adopted in my pamphlet as the only possible line of scientific statistical inquiry, and I maintain that the introduction of 'croup' into the diphtheria statistics, except in the way in which the Registrar-General introduces them, as an interesting consideration of 'approximate' mortality, is absurd. I repeat, the Registrar-General gives no warrant for Mr. Thomas Morison's inclusion of croup mortality with diphtheria mortality in order to support a theory as to the value of an alleged specific applicable only to the latter disease. If a disease has been diagnosed incorrectly, the treatment must also have been incorrect, and the mortality from that disease must, in consequence, have been proportionately great; hence the manifest absurdity of saddling one disease with the mortality of another disease erroneously diagnosed and treated, when the disease thus saddled is being considered solely in relation to treatment. One would have thought that the merest tyro in statistical lore would have seen the folly of such a procedure."

[N.B.—This correspondence ceased after a letter which appeared from the pen of Dr. Hadwen's opponent, who had hitherto signed his name as "Thomas Morison," under the new signature of "Thomas Maben," and Dr. Hadwen's cursory reference, in his reply, to the fact that "Maben was a name familiar to him as that of a representative of a firm of manufacturers of anti-toxin and other sera!"]

APPENDIX II.

The following correspondence between Dr. Hadwen and an anonymous medical man, presenting arguments for and against the use of anti-toxin, appeared in *The Hertfordshire Mercury* during the autumn of 1906 :—

To the Editor of THE HERTFORDSHIRE MERCURY.

Sir,—Will you allow me once more to reply in your columns to the Anti-vivisectionists who wrote in your last issue ?

I still maintain that the Registrar-General's Returns are *nihil ad rem*, for this reason : that they do not give us the total number of cases treated. Diphtheria is on the increase, but since the introduction of the anti-toxin treatment the case mortality has decreased. Here are the figures from the Metropolitan Hospitals' statistics :—

<i>Diphtheria.</i>			
Year.	Cases.	Deaths.	Mortality.
1894	9,641	2,870	29·7
*1896	11,399	1,763	15·4

The death-rate per 10,000 for fifteen years before the discovery of anti-toxin was 15 to 18 ; since then it is 7.—Yours faithfully,

MEDICO.

August 6, 1906.

To the Editor of THE HERTFORDSHIRE MERCURY.

Sir,—“ Medico ” declares “ diphtheria is on the increase, but,” he adds, “ since the introduction of the anti-toxin treatment the case mortality has decreased.” Now, if the mortality from a disease for which an alleged specific has been found is increasing, whilst at the same time the fatality is decreasing, does it not occur to “ Medico ” that there must be some fallacy which needs investigation ? He, however, airily dismisses the subject by quoting the Metropolitan Hospital figures for 1894 and 1896, and then lumping together the death-rate for fifteen years prior and subsequent to the discovery of anti-toxin.

Now, let us take these figures. During the two years 1894 to 1896, whilst the death-rate had decreased from 29·7 to 15·4 (“ Medico ” is mistaken here ; the correct figure is 21·2, not

* After the introduction of anti-toxin.

15·4), the number of cases had jumped up, he says, from 9,641 to 11,399. Why was this? There are only two possible causes; either (1) that diphtheria, in spite of improved sanitary conditions, had displayed an increased activity; or (2) that a number of cases had been counted in which were not diphtheria at all. I am loth to accept the first contention for reasons I will give presently, but I am inclined to accept the second, and if the latter be the true solution the decreased fatality is abundantly accounted for without any intervention of anti-toxin.

I will ask "Medico" to turn to page 58 of the 1896 report from which he quotes, where he will find the Medical Superintendent of the Fountain Hospital saying that the reason diphtheria has become a less fatal complication of scarlet fever "is to some extent attributable to the inclusion of mild cases." Dr. Turner himself admits, on page 172 of the 1898 report, that "improved means of diagnosis and isolation should share with anti-toxin the diminution in the death-rate"; and the Committee admit that the admissions have been "exceptionally great and rapid." What are these improved means of diagnosis which have helped to reduce the death-rate? Simply this: that every sore throat in which the Klebs-Löffler bacillus is found is now declared to be "diphtheria," although possibly only an ordinary ulcerative sore throat that our grandmothers would have cured in forty-eight hours. By adding these sore throats in "exceptionally great and rapid" quantity to the true diphtheritic cases, the death-rate of the whole is pulled down proportionately. Considering that every condition necessary to the identification of a specific organism has failed in the case of the Klebs-Löffler bacillus, the absurdity of diagnosing every case in which it is found as diphtheria is abundantly proved, for it is now well known that this micro-organism is often absent in true diphtheria, and is frequently found in throats where no suspicion of diphtheria is present.

Now let us revert to "Medico's" figures and ask if the quotation of the isolated reduction in diphtheria fatality between the years 1894 and 1896 is consistent with a fair and scientific examination of the subject? If your correspondent will go back another five years, to 1889, he will see that the mortality per cent. was 40·74, compared with his 29·7 in 1894. During those five years there had been a steady decline in the death-rate year by year without any anti-toxin intervention. What brought about this reduction? This reduction has steadily continued, but because anti-toxin drops in in the middle of a great downward statistical curve, "Medico" coolly selects 1894 in the centre of the drop and then quotes 1896—which merely continues the decline—as evidence of

the value of anti-toxin serum ! Is this an honest way of dealing with statistics ? Even the most ordinary tyro in statistics must admit that such a method of weighing evidence is worthless and misleading.

We will, however, look at it in another way. The later returns of the Metropolitan Asylums Board show that the statistics have been concocted by means of selected cases. Therefore, the whole of the official statistics are vitiated at the fountain-head. Referring to the very report which "Medico" quotes from, no less an authority than Dr. Lennox Browne said that when the error of refusing to administer anti-toxin to all severe cases, and so eliminating them from the statistics "is rectified, the improvement due to anti-toxin as practised in the Metropolitan Infectious Fever Hospitals for 1895 and 1896 is entirely dissipated." If anti-toxin is useless where it is most needed, and only valuable in cases which would probably get well without it, the man in the street is likely to look upon the whole serum business with suspicion.

But perhaps "Medico" will explain how it happens that in spite of these fictitious statistical methods of reducing the death-rate from diphtheria, the Metropolitan Asylums Board Report for 1904 provides the following revelation : Of 530 cases of diphtheria admitted to the North-Western Hospital, 172 were treated without anti-toxin and they all recovered, while of the remaining 358 treated with anti-toxin 42 died. And of the entire 5,422 diphtheria cases treated in the Board's hospitals, 4,839 were treated with anti-toxin, of whom 10.18 per cent. died, whereas of the 583 cases treated without anti-toxin, only 1.88 per cent. ended fatally. The latter included, too, all the most severe cases which the officials declined to administer anti-toxin at all. When "Medico" will prove the assertions he has made, and explain the facts I have adduced, your readers will be more satisfied as to his competency to deal with statistical problems than, I am sure, they are at present. There are still further fallacies of time, place, variableness of severity, and other factors which a scientific investigator should consider before incontinently rushing to a definite conclusion as "Medico" has done upon such slender evidence.

I may add I do not agree with "Medico's" method of pooh-poohing the Registrar-General's mortality returns. It is a startling fact that in spite of the rapid accession of mild cases, and of the use of anti-toxin serum, the London mortality has never been so low as in 1888, 1890, and in 1891, when no serum was used, and with one exception diphtheria mortality has never been so high as it has been since anti-toxin was introduced. My own opinion is that anti-toxin serum is

not only an absolutely useless but a very dangerous remedy.—
I am, Sir, Your obedient servant,

WALTER R. HADWEN, M.D.

Gloucester, August 14, 1906.

To the Editor of THE HERTFORDSHIRE MERCURY.

Sir,—In your last issue Dr. Hadwen quarrels with the figures I quoted about diphtheria. They are the result of Dr. Bosanquet's work on the subject in his exhaustive treatise on "Serum Therapy," so possibly Dr. Hadwen would like to think twice before criticising them in such a superior manner. I quote the following words of Stephen Paget in support of them: "The lowering of the case mortality since 1894 cannot be explained away by any theory that the disease suddenly became mild. First, because the general mortality has gone up, not down. Next, because anti-toxin results were the same everywhere, all at once, and all over the world; and the clinical aspect of the disease under the new treatment was changed alike in mild cases and in bad cases." Compare two opinions: Dr. Hadwen says anti-toxin serum is "not only absolutely useless, but a very dangerous treatment." Mr. Muirhead Little—a well-known surgeon—says: "I owe my life to the prompt use of anti-toxin." "Experto crede."

Appended is the total list of case mortality per 100 from the Metropolitan Hospitals statistics:—

1889	40·74	1895*	22·55
1890	33·55	1896	20·80
1891	30·63	1897	17·30
1892	29·35	1898	15·50
1893	30·42	1899	14·05
1894	29·64	1900	12·01

I fail to see the downward curve Dr. Hadwen mentions, and in reading these figures one must remember that diphtheria is on the increase, as the successful preventive treatment by the prophylactic use of anti-toxin has yet to be accomplished.—
Yours faithfully.

MEDICO.

P.S.—In 1895, during a diphtheria epidemic in Berlin, the supply of anti-toxin ran short, and the mortality at once rose from 15·6 to 48·4 per cent.

* First anti-toxin year.

Sir,—I am afraid “Medico” is getting somewhat “mixed.” He warns me that the figures he quoted about diphtheria “are the result of Dr. Bosanquet’s work on the subject in his exhaustive treatise on Serum Therapy,” and he advises me to “think twice before criticising them in a superior manner” ! But in “Medico’s” former letter he says : “Here are the figures from the Metropolitan Hospital statistics.” He repeats these figures, again giving the latter at his source of information ; only on this occasion he is fortunate in quoting them more correctly.

Now, the fact is “Medico” has shown abundantly that he knows little of the subject upon which he has posed with such authority. The little he has vouchsafed he has taken second-hand from Mr. Stephen Paget, whom I have fully answered elsewhere, and whose recklessness of statement upon the subject of vivisection is proverbial. It is not surprising under these circumstances that “Medico” has carefully refrained from facing any one of the arguments I brought forward in my letter of the 18th showing the fallacy of the statistics he quoted, and until he is prepared to comply with my request to “prove the assertions he has made and explain the facts I have adduced,” he must allow your readers to form their own judgment as to his ability to do so.

The capability of “Medico” to deal with statistics is evidenced in the concluding paragraph of his letter. He gives *seriatim* the case mortality of the Metropolitan Hospitals Board from 1889 to 1900 ; and although the death-rate in the lists he himself provides is shown to diminish year by year from 40·74 in 1889 down to 12·01 in 1900, “Medico” innocently remarks : “I fail to see the downward curve Dr. Hadwen mentions.”

I will try to help him to see the force of his own figures. He has faithfully copied out two lists. They are divided equally. The first presents the figures of diphtheria mortality for the six years preceding the introduction of anti-toxin, and the second those for the six years following its introduction. In the first list, the death-rate begins in 1889 with 40·74 and ends in 1894 with 29·64 ; that is, a reduction of 11·10 per cent. In the second list the decline continues at a proportionate ratio. It starts in 1895 with 22·55 and ends in 1900 with 12·01 ; that is, a reduction of 10·54. So that, according to “Medico’s” own showing, during the six years when there was no anti-toxin the net gain in the death-rate was 11·10 ; and in the six years when there was anti-toxin, when cases were selected and common sore throats were added by the thousand, the net gain was only 10·54 ; thus leaving the anti-toxin years 0·56 to the bad. Does it not strike “Medico” that if the great strides in

sanitary improvements which did so much to reduce diphtheria in the non-anti-toxin and following years had been still relied upon, a far greater success would most probably have been achieved?

But "Medico's" comment upon the total result is worth republication: "In reading these figures," he says, "one must remember that diphtheria is on the increase, as the successful preventive treatment by the prophylactic use of anti-toxin has yet to be accomplished"! I agree with him. But will he be good enough to explain what he means by "preventive treatment"? Is everybody to be anti-toxined in order to prevent a problematical attack of diphtheria in the future? And now, having explained to "Medico" his own figures, which he tacitly confessed he did not understand, would it not be well for him to ask himself whether the increased mortality from diphtheria (for that is, I suppose, what he means) is likely to possess any corresponding relationship to the increased use of the dangerous and repulsive treatment he advocates?

In his postscript "Medico" says: "In 1895, during the diphtheria epidemic in Berlin, the supply of anti-toxin ran short, and the mortality at once rose from 15.6 to 48.4 per cent." This, again, he copies from Mr. Stephen Paget on page 91 of his "Experiments on Animals." But is there no other explanation of this almost miraculous jump? Is it possible that when the death-rate stood at 15.6 all the severe and moribund cases had been denied the blessing of this heaven-sent "prophylactic," and were therefore taken out of the count; but that when the anti-toxin ran short they all got counted in together, and thus the total was lumped up at 48.4?

"Medico" may assert that this suggestion is a libel on the hospital officials. But it is noteworthy that at the Hospital for Sick Children in Paris, when Roux, the bacteriologist of the Pasteur Institute, compiled the statistics of the year 1894 (subsequent to introduction of anti-toxin), and startled the profession by the announcement of a sudden decline in the death-rate, he had to admit when taxed upon the subject that he had suppressed 20 cases which had died before treatment could be resorted to. His glowing statistics at once lost their brilliant complexion. And supposing the same "accidental circumstance" occurred in Germany! Perhaps "Medico" can help us?—I am, Sir, Yours obediently,

WALTER R. HADWEN, M.D.

Gloucester, August 28.

Sir,—Dr. Hadwen, in your last issue, had recourse to a very typical ruse with regard to the figures I quoted on the 18th ult. Because the figures were in columns he imagines your readers will be satisfied if he subtracts the bottom from the top on each side to get a comparison of results. . . .

He carefully subtracts 12·01 from 22·55, which was an anti-toxin year, whereas if he had been fair he should have subtracted it from 29·64, which was the year before anti-toxin treatment came in ; this would have given him 17·63, not 10·54. This was artifice number one.

His next is equally futile. In his previous letter he says : ‘ Anti-toxin drops in in the middle of a great downward statistical curve.’ In reply, I said from the figures quoted I failed to see that curve, so he kindly assists me by *quoting the anti-toxin year figures to support his pre-anti-toxin year’s assertion*. If Dr. Hadwen will plot a curve from 1891 till 1894 he will find there is no downward movement, whereas from 1895 onwards there is a continuous drop, but let him remember that it is due to anti-toxin treatment, or, at least, let him be fair and not “ juggle ” with the figures.

My reply to his attempts to explain away the sudden rise in death-rate in Berlin, when anti-toxin ran short, by the various possibilities he suggests is : “ Pigs might fly, but they are rather unlikely birds.”—Yours faithfully,

MEDICO.

September 1, 1906.

Sir,—“ Medico ” still avoids compliance with my repeated request to “ prove the assertions he has made, and explain the facts I have adduced.”

He now accuses me of having “ had recourse to a very typical ruse ” ; and forthwith professes “ to fully show up my methods.” I can quite believe your correspondent to be perfectly honest in supposing that I have “ juggled the figures,” owing to the fact that he has copied his statistics from the work of another writer and does not himself understand their purport.

In the first place, let me point out that statistics are valueless unless they are built upon a reliable basis. The real force of my arguments has been to show that the basis of the Metropolitan Asylums Board’s figures is unreliable, and any deductions therefrom are, in consequence, misleading. My arguments in support of my contention “ Medico ” declines to face, but yet wants to draw his own conclusions in his own way from the figures themselves, before he has substantiated their claim to recognition.

Whilst, however, declining for the reasons vouchsafed to admit the tables supplied by "Medico" to be fair ground for discussion, I nevertheless have accepted them for argument's sake, in order to point out that the only prop which your correspondent has to lean upon fails to support the weight of his own credulity.

The real question is, not as "Medico" supposes, how far the death-rate for the six anti-toxin years is below the death-rate of the six pre-anti-toxin years (although the point is not without interest), but how does he account for the fact that the death-rate declined at a greater ratio during the latter period than during the former?

But "Medico" naïvely suggests the elimination of the years 1891 to 1894 from his list of pre-anti-toxin years because, he says, "there is no downward movement"—an inexcusable error, as your readers can perceive for themselves, for the slight exacerbation in 1893 does not nullify the obvious progressive decline. But to oblige him we will strike out those years altogether. And now he is faced with a worse difficulty than ever. There is left standing alone in the opposite table the years 1889 and 1890 thus:—

Case Mortality per 100.

1889 40·74

1890 33·55

Here we see that long years before anti-toxin was boomed there was in one short twelve months a decrease in the death-rate of diphtheria three times greater than the highest recorded decrease in any one year throughout the whole anti-toxin period! How does he account for that? This decrease in one year without the use of anti-toxin is equal to about 75 per cent. of the total decrease of all the anti-toxin years put together! Will he explain this?

"Medico," however, says I ought to have deducted the death-rate of the year 1900 from 1894 and not from 1895, which would have given a bigger percentage to anti-toxin. It would have proved nothing if I had done so, and if he wished this he should have rearranged the tables. But it would have landed him in this difficulty. Seeing that the decrease in the six pre-anti-toxin years shows a *natural* decline of 11·10 on the whole, how much is he going to allow for similar decline between 1894 and 1895? He will at once say: "But the decline between 1894 and 1895 was the big one of 7·09, and that must have been due to anti-toxin." My answer is: "But the decline between 1889 and 1890 was bigger, namely, 7·19, and without any anti-toxin at all!" How does he explain that?

Further, "Medico" must remember that anti-toxin was not introduced on the Continent till toward the close of 1894, and it was well on into 1895 before it came to this country, and considerably later before it was generally adopted, so that the figures would have to be corrected for this fallacy as well as for a general decline; and when, in addition to this, allowance was made for all the severe and moribund cases not anti-toxined at all, but which were made to swell the list of victims who were supposed to die from the lack of its administration, I am afraid, even with 1894 thrown in, "Medico's" pet list would make a very poor show, especially when natural decline must be allowed for all the way through, unless he can show some sound reason to the contrary.

As a control experiment, however, I will ask "Medico" to glance at the official statistics from Berlin for the same period. Perhaps he can explain them:—

In 1895	5,972	cases	;	939	deaths	;	fatality	15·7	per cent.
1896	4,178			575				12·3	
1897	3,646			507				13·9	
1898	4,278			608				14·2	
1899	3,817			608				15·9	
1900	3,096			534				17·2	

Here is a regular and constant progression in the death-rate during the period when anti-toxin came into general use.

In Paris, during the same period, the death-rate increased about 50 per cent. No wonder it is beginning to be felt that diphtheria anti-toxin needs "perfecting"; and until it is "perfected" I think the less "Medico" says about it the better.

But these are not the only control experiments. Neumeyer gives statistics of 1,000 cases of diphtheria patients treated without anti-toxin during fifteen years with only six deaths; that is, 0·6 per cent. And Neumann, of Potsdam, shows that whilst the hospitals were recording an average death-rate of 13 to 15 per cent. with the use of serum during 1894 to 1898, he, in his own practice, had an average death-rate of only 1·6 per cent. without any serum at all. These facts need no comment.

"Medico" answers my suggestion as to how the temporary increase in the death-rate of diphtheria occurred in Berlin in 1895 by the elegant retort, "Pigs might fly," &c. Would it surprise him to know that the method I suggested was that adopted by the Metropolitan Asylums Board, upon whose statistics he fondly relies to bolster up his fatuous creed?—I am, Sir, Your obedient servant,

WALTER R. HADWEN, M.D.

Gloucester, September 10, 1906.

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